DOCUMENT RESUME

ED 177 846 FL 007 926

AUTHOR Snow, Catherine E.; Hoefnagel-Hoehle, Marian
TITLE Age Differences in Second Language Acquisition.
PUB DATE Aug 75
NOTE 18p.; Paper presented at the Congress of the International Association of Applied Linguistics (4th, Stuttgart, West Germany, August, 1975); Not available in paper copy due to broken type in original document ; Research supported by the Netherlands Foundation for the Advancement of Pure Research, The Hague

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Age Differences; Auditory Discrimination; *Dutch; Language Research; *Language Skills; Language Tests; Morphology (Languages); *Phonology; Pronunciation; Psycholinguistics; *Second Language Learning; Syntax; Vocabulary
IDENTIFIERS Netherlands; *Non Native Speakers

ABSTRACT

English-speaking children and adults who were learning Dutch at school and at work, without signigicant amounts of foreign language instruction, were tested at five-month intervals during their first year in Holland. The test battery included tests for active and passive control of phonology, morphology, syntax and vocabulary. Significant improvement occurred during the course of the year on all tests for subjects from all age groups. No age differences were observed in speed of acquisition for the phonology tests, nor did the English speakers reach native-like performance on these tests during the period observed. The tests reflecting knowledge of rule systems, i.e., morphology and syntax, did show large age differences, in all cases favoring the teenage group and with the youngest children scoring worst. The subjects achieved near-native performance on these tests during the period studied. (Author)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED177846

Age Differences in Second Language Acquisition

Catherine E. Snow and Marian Hoefnagel-Höhle

Institute for General Linguistics
University of Amsterdam
Spui 21
Amsterdam, The Netherlands

Paper presented at the 4th Congress of the International Association of Appled Linguistics, Stuttgart, August, 1975.

FL007926

'This research was supported by The Netherlands Foundation for the Advancement of Pure Research (ZWO). Preparation of the paper was carried out while the first author was at the Unit for Research in the Medical Applications of Psychology, University of Cambridge.'

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

Catherine Snow

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

The question whether there are age differences in the ability to acquire a second language is relevant to two issues of interest to psycholinguists, one of applied and one of primarily theoretical importance. If there are age differences, these should be taken into account in planning second language education programs, so that the period of fastest and easiest acquisition is the period when second language training is offered. If there are no age differences, then our ideas about the nature of first language acquisition must be somewhat modified. First language acquisition has traditionally been seen as a unique process which occurs during a period of optimal brain plasticity and which is different in nature from later language acquisition or from the other kinds of learning that young children undergo. If second language acquisition occurs equally quickly and effectively in very young children and in older children and adults, this would suggest that young children have no particular facility for language acquisition, and that first language acquisition therefore might be quite similar to the acquisition of any complex skill.

It is, of course, a mistake to think of language acquisition either first or second, as a single, monolithic process. Speaking a language involves several, separate skills, and there is no a priori reason to assume that all those skills are acquired equally easily by any individual. Second language teachers are constantly confronted with students who do quite well in some aspects of the training, eg, learning vocabulary but who never achieve great success in other aspects, eg, correct word order, or accent. Such individual differences in the profile of component abilities are probably present for one's first language as well, but are less noticeable because of the generally higher level of achievement in all component skills.

Pronunciation is one component of second language skill which is most commonly cited as showing age differences, and receptive control of the second language's phonological system is often thought of as having a critical period as well. A complete test of the hypothesis that there are no age differences in second language acquisition requires separate tests for all the separate indentifiable components of language skill -

receptive and productive control of morphology, syntax, vocabulary and fluency skills as well as phonology.

Besides looking for age differences in speed or effectiveness of acquisition of the various component language skills, one might also wish to test the strongest form of the hypothesis that there are no age differences by looking for age differences in strategies of acquisition. Various researchers have recently stressed the similarities between first and second language acquisition (Corder, 1974; Hansen-Bede, 1975; Holley and King, 1974; Macnamara, 1973), pointing out that errors typical of first language acquisition such as overgeneralization also occur in second language acquisition (Ravem, 1974; Richards, 1974; Snow, 1974), and that interference is of limited importance (Buteau, 1974; Wardhaugh, 1974). These conclusions disagree with the traditional view based on contrastive analysis, concerning the prevalence of interference errors. One possible explanation for the disagreement is that interference errors may be more typical of those who have gone through second language training, whereas those who learn a second language in an unstructured, "picking-it-up" situation may use strategies more similar to those of the first language learner.

We have attempted to test the strong version of the hypothesis that no age differences in the ability to acquire second language exist by studying acquisition in a natural situation, by assessing achievement with a large battery of tests, and by performing error analyses as well as quantitative analyses on the results. Because of limitations on length, only quantitative analyses on only the most important tests from the battery will be discussed in this paper. Further results will be treated in forthcoming reports.

PROCEDURE

Subjects

Native speakers of English who were living in Holland were recruited as subjects. Forty-two of the subjects had arrived within three months before the first test session; almost all the school children in this group had received their first real exposure to Dutch at the start of the school year, within a month before the first test session. This group, called the Beginners, were divided

into five age groups:
Seven 3-5 year olds, eight 6-7 year olds, ten 8-10 year olds, six 12-15 year olds, and eleven adults. These subjects were tested three times at 4½ month intervals, to assess their progress in speaking Dutch. Another twenty-seven native English speakers who had been in Holland at least a year, and all of whom were functioning as adequate bilinguals, were also tested once. These Advanced subjects fell into four age groups:
Six 6-7 year olds, six 8-10 year olds, six 12-15 year olds, and nine adults. In addition, some of the tests from the test battery were administered to eight 6-7 year old and eight 12-15 year old native Dutch speakers, to provide some norms for assessing the level of achievement of the English speakers.

Test Battery

Only those tests to be discussed in the results section will be described here. A fuller account of the test battery can be found in Snow (1974).

Pronunciation

Eighty pictureable words were chosen which contained problematic Dutch phonemes in initial, medial, and final position. The subjects pronounced each of these words directly imitating a native speaker, and then again a few minutes later named the pictures without an immediate auditory model. These productions were individually scored on a 6 point scale (0 = English word produced instead of Dutch; 2 = very strong English accent in Dutch word; 5 = perfect native-like pronunciation) by a native speaker. The judge scored all productions on two separate occasions and achieved high reliability. A second judge also scored a portion of the productions, and achieved acceptable levels of agreement with the first judge. The individual subject's score is given as a mean of the score achieved on all the words attempted in the spontaneous production condition, and on all the words in the imitation condition.

Auditory discrimination

Pictureable words representing minimal pairs for Dutch phoneme distinctions not present in English were chosen. These words were spoken in a random order by a native speaker, and the subject was instructed to point to the correct picture. Some errors on this test reflected vocabulary - some of the subjects

simply did not know all the test words. The errors which reflected true auditory confusions were divided by the total number of correct answers plus auditory confusions, to give a subject's score.

Morphology

Knowledge of morphology was tested with an adaptation of the Berko (1958) wug test, in which nonsense words are presented with pictures in order to elicit the desired morphological changes. Tests for plural, agentive, diminutive, past tense, and past participle were included, as well as a sub-test for final devoicing when forming the singular from the plural.

Peabody Picture Vocabulary Test

The PPVT (Dunn, 1959) was administered in English at session 1 and in Dutch at all sessions. The standardized Dutch translation (Manschot and Bonnema, 1974) was used up to item 100 (as far as it goes), and our own translation for items 100-150.

Sentence repetition

Thirty-seven sentences of increasing length and syntactic complexity were read one-by-one by a native speaker to each subject, who was asked to repeat them. The number of words correctly repeated from the model sentences was taken as each subject's score.

Translation

Sixty sentences of increasing difficulty were given in English, and the subjects were asked to translate them into Dutch. Help was given with any content words the subject did not know. The translations were scored structure by structure; the quantitative scores presented here represent each subject's total points correct (maximum 325).

These and other tests in the battery were administered individually to the subjects at home or at school in a relaxed test session lasting about an hour and a half. The numbers of subjects reported on for each test vary slightly because some subjects were added to the sample too late to be scored for all tests, and because some of the younger subjects refused to do some tests. In addition some of the beginners were lost between sessions 1 and 2. The third test session is not yet completely analysed, and only the first and second will be discussed here.

Results

Significant improvement was made by the Beginners as a group on all six tests between session 1 and session 2 (tested in all cases with Wilcoxon signed-ranks test for those subjects available at both sessions). This improvement indicates that the tests used were sensitive to level of achievement, and that considerable acquisition was occurring for our subjects. The improvement will not be discussed for each test separately.

The statistical analysis was essentially the same for all six tests, and will not be described in each section. Age differences were tested with the Kruskal -Wallis nonparametric one-way analysis of variance. Differences between the Beginners at session 2 and the Advanced groups, and between the Advanced groups and the Native Speakers, were tested for each age group separately with the Mann-Whitney U. Outcomes of the specific tests are given in the relevant tables.

Pronunciation

The pronunciation test showed only marginal age differences. There was a significant age difference for spontaneous production at session 1 (see Table 1), with the older subjects performing better. The younger subjects showed significantly greater improvement, such that no age differences existed by session 2. The Advanced subjects showed no age differences. By session 2 the performance of the Beginners was no longer significantly worse than that of the Advanced subjects, tested for each age group separately. However, none of the Advanced subjects had achieved perfect, native-like pronunciation on all words. Imitation was significantly better than spontaneous production (Wilcoxon signed-ranks test), but this difference decreased in session 2 and had almost disappeared in the Advanced subjects.

Auditory Discrimination

There were no significant age differences in Auditory Discrimination. The Beginners in the second session were no longer significantly worse than the Advanced groups, though their median performance was still considerably lower (see Table 2). The Advanced subjects were significantly, though not greatly, worse than their age mates who were native speakers.

Morphology

The morphology test showed enormous age differences in favor

of the older subjects (see Table 3). These differences were so great that the test could not even be successfully administered to anyone in the two youngest groups at the first session. At the second session, the youngest children did all attempt the test, though they still produced very few correct answers. The Advanced subjects showed no age differences. The three oldest groups of Beginners achieved the level of the Advanced subjects by session 2, but the Advanced 6-7 year olds were significantly better than the 6-7 year old Beginners at session 2. The 12-15 year old native speakers were significantly better than the Advanced 12-15 year olds.

The pattern of increase with age on the Morphology Test deserves special mention, as it recurs in the rest of the tests to be discussed. Steady increase with age is seen up to the teenagers; the adults score at or a bit below the teenage level, but still better than any of the younger groups. This age difference decreased by session 2, and had disappeared for the Advanced subjects.

Vocabulary

The Dutch PPVT showed an age effect very similar to that described for morphology: steady significant increase up to the teenage group, with the adults scoring slightly worse than the teenagers (see Table 4). The age pattern was more persistent on the PPVT, as it was still marked at session 2, and even for the Advanced subjects. That this "teenage ceiling" is typical only for second language acquisition can be seen from the scores on the English PPVT, which show the expected steady increase with age continuing through adulthood.

There were no significant differences between the Beginners at session 2 and the Advanced subjects, but both groups of native speakers were significantly better than the Advanced groups of the same age.

Sentence Repetition

Significant age differences, conforming to the teenage-ceiling effect, were present at both sessions for the Beginners, but were much decreased in size by session 2 (see Table 5). Interestingly, the native speakers also showed a significant age effect, though the Advanced English speakers did not. The Advanced subjects were as good as the native speakers, and

the Advanced 6-7 year olds and adults were significantly better than the Beginners.

Translation

As for Sentence Repetition, large significant age differences for the Beginners at session 1 and smaller but still significant age differences at session 2 were found for the translation test. The teenagers scored the best, and the adults scored slightly better than the 8-10 year olds. There were no age differences for Advanced subjects, who in all age groups except 12-15 were significantly better than the Beginners at session 2.

DISCUSSION

To summarize the results:

1. Considerable improvement occurred in all aspects of knowledge of Dutch for subjects of all ages. However, this improvement occurred at different rates for the different aspects and the different age groups.
2. Older learners seemed to have an advantage over younger learners in acquiring the rule-governed aspects of a second language-morphology and syntax. This advantage of age was, however, limited, as the teenagers did better than the adults, and reflected simply rate of acquisition, not an upper limit on ability, since age differences on these tests diminished and disappeared with longer residence in Holland. It also seemed to be possible to attain native levels of performance on these tests within a couple of years of exposure to the second language.
3. There were no or very small age differences for tests reflecting control of the phonetic system, and the native level of performance was not achieved by non-native speakers on these tests.

These results are fairly clearcut; their interpretation, however, is somewhat less clear. This pattern of results is consistent with a number of different possible realities as to the existence of age differences in the ability to acquire a second language. It might be the case that the underlying reality is reflected directly in the results - that teenagers really are better at second language acquisition than any other age group. This seems unlikely, however, since it does not accord with any known psychological age functions. The oldest adult in the

study was in his fifties, and most were in their twenties or thirties, so they were not suffering from any geriatric decline in learning ability. One would normally expect a steady increase with age up to age forty at least for "learning how to learn" abilities.

The second possibility is that the ability to acquire rule systems does in fact increase steadily with age, or reaches an asymptote in the teens, but that the adults did worse than the teenagers because of differences in their situations. It is possible that the adults found themselves in a much less adequate second language environment, that less severe communicative demands were made upon them, that less support was given them in learning Dutch, that the kind of Dutch they heard was less appropriate as a basis for learning the language, etc. All the nonadults in this study were learning Dutch primarily in school, from teachers and from classmates. The adults were quite varied in their contacts, but it was probably the case that none of the adults encountered very many situations in which knowledge of Dutch was absolutely crucial to effective communication. This was not the case for the schoolchildren, and may well explain why adults do worse than teenagers in acquiring Dutch. This explanation receives some support from the fact that the adults scored only at the teenage level on the vocabulary test as well as on the morphology and syntax tests. though acquisition of vocabulary in one's first language continues into adulthood (as shown by the scores on the English version of the PPVT), and thus cannot be subject to any age limitation.

The third possibility is that acquiring rule systems is in fact equally difficult for all ages, and that, in conformity with popular belief, acquiring the phonetic system gets progressively more difficult with age. The pattern of results obtained in this study could then be explained as a result of increasingly appropriate second language learning environments as the children get older, which offset the inherent advantage of the younger children. This possibility is not counterintuitive to anyone who has observed the language environment of and communicative demands made in various classrooms. Kindergarten children whom we tested and observed seemed to be able to function fairly well in the school situation without any specific linguistic interaction with either classmates or teacher, whereas most of the teenagers were attending

quite demanding academic high schools and required a fair command of Dutch in order to keep up with their studies.

It is clear that this kind of naturalistic study is only a first step in answering the question whether there are age differences in the ability to acquire a second language. It is inadequate in precisely the same way that the 1960's studies of first language acquisition were inadequate - in that both ignored the linguistic environment and the communicative needs of the language learner. A fuller answer can come either from a study of second language acquisition under precisely controlled input conditions or from a detailed, ecological study of second language acquisition, including observations of the acquisition process as well as measurements of the achievements. Both these approaches have their problems. Controlled input conditions imply nonnatural second language learning - a second language classroom situation, or an unmotivated learning experiment approach. Neither of these could be said to be highly relevant to the question of language acquisition. The ecological approach, in which extensive observations are made relevant to all the complex factors which might be hypothesized to influence success of second language acquisition, is timeconsuming, intrusive, and probably impossible to achieve completely.

Precisely because neither of these approaches is by itself entirely satisfactory, we have decided to use both of them in attempting to sort out the reality underlying our findings on age differences in second language acquisition. We are currently starting two studies, one a study of age differences in the ability to pronounce foreign sounds in a controlled input situation, and the second a study of the language environment of a new set of English speakers learning Dutch in a natural situation. We hope that these two approaches in combination will give us considerably more basis for interpreting the very striking age differences we have found in second language acquisition.

Berko, J. The child's learning of English morphology. Word, 1958, 14, 150-177

Buteau, M. Students' errors and the learning of French as a second language. In J. Schumann and N. Stenson (Eds), New Frontiers in Second Language Learning. Newbury House, Rowley, Mass, 1974.

Corder, S.P. The significance of learners' errors. In J. Schumann and N. Stenson (Eds), New Frontiers in Second Language Learning Newbury House, Rowley, Mass, 1974

Dunn, L. Peabody Picture Vocabulary Test. American Guidance Service, Inc: Circle Pines, Minnesota, 1959.

Hansen-Bede, L. A child's creation of a second language. In Working Papers on Bilingualism, No 6, May 1975.

Holley F. and King J. Imitation and correction in foreign language learning. In J. Schumann and N. Stenson (Eds), New Frontiers in Second Language Learning. Newbury House, Rowley, Mass, 1974.

Macnamara, J. The cognitive strategies of language learning. In J. Oller and J. Richards (Eds), Focus on the Learner: Pragmatic perspectives for the language teacher. Newbury House, Rowley, Mass, 1973.

Manschot, W. and Bonnema, J. Experimentele Nederlandse normering van de Peabody Picture Vocabulary Test. Swets and Zeitlinger: Amsterdam, 1974.

Ravem, R. The development of wh-questions in first and second language learners. In J. Schumann and N. Stenson (eds), New Frontiers in Second Language Learning. Newbury House, Rowley, Mass, 1974

Richards, J. Error analysis and second language strategies. In J. Schumann and N. Stenson (Eds), New Frontiers in Second Language Learning. Newbury House, Rowley, Mass, 1974.

Snow, C. Semantic primacy in first and second language acquisition Paper presented to meeting of the Dutch Association of Applied Linguistics (ANeLA), Amsterdam, Nov, 1974.

Wardhaugh, R. The contrastive analysis hypothesis. In J. Schumann and N. Stenson (Eds), New Frontiers in Second Language Learning. Newbury House, Rowley, Mass, 1974.

TABLE 1

Results of the Phonology Test. Medians for the various age groups on Imitation (Imit) and Spontaneous Production (Spon) of 80 test words. 5 represents a perfect native-like pronunciation

	BEGINNERS						ADVANCED		
	session 1			session 2					
AGE	n	Imit	Spon[1]	n	Imit	Spon	n	Imit	Spon
3-5	7	3.80	2.00	7	4.20	4.20			
6-7	8	4.05	2.80	4	4.75	4.30	5	4.60	4.60
8-10	10	3.95	3.10	5	4.55	4.40	4	4.70	4.50
12-15	6	4.30	3.55	6	4.55	4.30	3	4.67	4.50
adult	11	4.28	3.73	10	4.35	4.05	2	4.25	3.90

[1]Significant age difference for the column indicated, tested with the Kruskal-Wallis one-way analysis of variance ($H = 10.70$, $p < 0.05$).

Note: Improvement from Time 1 to Time 2, tested with the Wilcoxon signed-ranks test, was highly significant for both imitation ($T = 56.5$, $Z = 3.88$, $p < 0.0001$) and for spontaneous production ($T = 0$, $Z = 4.94$, $p < 0.0001$). There were no significant differences between the beginners at session 2 and the advanced subjects of the same age (tested with the Mann-Whitney U).

TABLE 2

Results of the Auditory Discrimination Test. Median percentage incorrect answers in each group are presented.

	BEGINNERS				ADVANCED		NATIVE SPEAKERS	
AGE	n	session 1	n	session 2	n		n	
3-5	7	22.2	7	17.8				
6-7	8	23.6	5	17.6	5	3.9	8	1.8
8.10	10	20.3	7	12.2	6	4.8		
12-15	6	7.3	6	4.5	6	2.8	8	1.8
adult	11	15.9	10	16.1	8	7.7		

Note: There were no significant differences due to age. The improvement from session 1 to session 2 was significant (Wilcoxon signed-ranks test $T = 152.5$, $Z = 2.66$, $p < 0.01$). There were no significant differences between the Advanced subjects and the Beginners at session 2. The native speakers were significantly better than the Advanced subjects in both the 6-7 (Mann-Whitney $U = 9.0$, $p < 0.05$) and the 12-15 ($U = 9.0$, $p < 0.05$) year old groups.

TABLE 3

Results of the Morphology test. Median number of correct responses per group are presented (maximum possible score was 82).

	BEGINNERS				ADVANCED		NATIVE SPEAKERS	
AGE	n	session 1[1]	n	session 2[1]	n		n	
3-5			7	1.0				
6-7			4	13.5	4	46.5	8	50.0
8-10	10	20.0	5	38.2	6	52.5		
12-15	6	36.5	6	43.0	5	43.0	8	69.0
adult	11	33.0	10	42.0	9	48.0		

[1] Significant age effect for the column indicated, as tested with Kruskal -Wallis one-way analysis of variance. For session 1, $H = 11.2$, $p < 0.01$; for session 2, $H = 22.9$, $p < 0.001$.

Note: Improvement from session 1 to session 2 was significant (Wilcoxon signed-ranks test, $T = 7$, $p < 0.01$). The Advanced 6-7 year olds were significantly better than the Beginners at session 2 (Mann-Whitney $U = 0$, $p < 0.02$), as were the 12-15 year olds (Mann-Whitney $U = 2.5$, $p < 0.01$).

TABLE 4

Results of the Peabody Picture Vocabulary Test. Maximum possible score for the Dutch version was 50 for the 3-7 year olds, and 100 for the older subjects. Subjects were tested to ceiling in the English version.

	BEGINNERS					ADVANCED			NATIVE SPEAKERS	
	session 1			session 2						
AGE	n	English[1]	Dutch[1]	n	Dutch[1]	n	English[1]	Dutch[1]	n	Dutch[1]
3-5	7	45.2	24.8	7	30.0					
6-7	8	50.3	29.5	4	41.0	6	44.0	45.5	8	49.9
8-10	10	79.5	56.1	5	68.0	6	73.0	80.5		
12-15	6	108.0	71.5	6	80.0	5	82.0	86.7	8	94.5
Adult	11	140.5	68.0	10	74.0	9	136.0	87.0		

[1] Significant age effect for the column indicated, as tested with the Kruskal -Wallis one-way analysis of variance. Beginners, English, $H = 34.8$, $p < 0.0001$; Beginners, Dutch, session 1, $H = 36.0$, $p < 0.001$; Beginners, Dutch, session 2, $H = 25.7$, $p < 0.001$; Advanced, English, $H = 21.3$, $p < 0.001$; Advanced, Dutch, $H = 14.1$, $p < 0.01$; Native Speakers, Mann-Whitney $U = 0$, $p < 0.01$.

Note: Significant improvement occurred between session 1 and session 2 (Wilcoxon signed-ranks test, $T = 5$, $Z = 4.76$, $p < 0.0001$).

There were no significant differences between the Beginners at Time 2 and the Advanced subjects. Both groups of native speakers were significantly better than the Advanced subjects (for 6-7 year olds, Mann-Whitney $U = 7.0$, $p < 0.01$; for 12-15 year olds, $U = 1.5$, $p < 0.01$).

TABLE 5

Results of the Sentence Repetition Test. Median number of words correctly repeated per group are presented. Maximum possible score was 238.

	BEGINNERS				ADVANCED		NATIVE SPEAKERS	
AGE	n	session 1[1]	n	session 2[1]	n		n	
3-5	7	54.0	7	178.0				
6-7	8	87.5	5	172.0	6	213.5	8	220.0
8-10	10	134.5	7	211.0	6	233.0		
12-15	6	204.0	6	225.0	5	234.0	8	234.0
adult	11	171.0	10	190.5	9	229.3		

[1] Significant age effect for the column indicated, as tested with a Kruskal-Wallis one-way analysis of variance (for session 1, $H = 21.4$, $p < 0.001$; for session 2, $H = 13.9$, $p < 0.01$). Improvement between sessions 1 and 2 was highly significant (Wilcoxon $T = 1$, $Z = 5.15$, $p < 0.0001$). The 6-7 year old Advanced subjects were significantly better than the 6-7 year old Beginners at session 2 (Mann-Whitney $U = 3.0$, $p < 0.02$), and the Advanced adults were better than the adult Beginners ($U = 6.0$, $p < 0.001$). The Advanced subjects were not significantly different from the native speakers.

TABLE 6

Results of the Translation Test. Medians are presented per group. Maximum possible score was 325.

	BEGINNERS				ADVANCED	
AGE	n	session 1[1]	n	session 2[1]	n	
3-5	7	6.0	7	82.0		
6-7	7	30.0	4	135.0	4	267.5
8-10	10	153.5	5	234.0	5	288.0
12-15	6	242.5	6	273.5	5	292.0
adult	11	185.0	10	234.0	9	281.0

[1] Significant age effect for the column indicated, as tested with Kruskall-Wallis one-way analysis of variance (for session 1, $H = 23.7$, $p < 0.001$; for session 2, $H = 17.5$, $p < 0.01$). The advanced subjects in all age groups except 12-15 were significantly better than the Beginners at session 2 (for 6-7, Mann-Whitney $U = 0$, $p < 0.03$; for 8-10, $U = 1$, $p < 0.02$; for adults, $U = 13$, $p < 0.01$).